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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/788,967	02/26/2004	Philip R. Swinehart	128321.101	5456

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EXAMINER
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SINES, BRIAN J

ART UNIT	PAPER NUMBER
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1743

DATE MAILED: 08/23/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/788,967

Applicant(s)

SWINEHART ET AL.

Examiner

Brian J. Sines

Art Unit

1743

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 23 May 2005.  
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-40 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
5) ☒ Claim(s) 32-40 is/are allowed.  
6) ☒ Claim(s) 1-31 is/are rejected.  
7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.  
10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.  
4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_.  
5) ☐ Notice of Informal Patent Application (PTO-152)  
6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Allowable Subject Matter***

The indicated allowability of claims 1 – 16 & 26 – 31 is withdrawn in view of the newly discovered reference(s) to Burdon et al. (U.S. Pat. No. 6,572,830 B1), Faris et al. (U.S. Pat. No. 6,734,436 B2), Gascoyne et al. (U.S. Pat. No. 6,703,819 B2), Pourahmadi et al. (U.S. Pat. No. 6,664,104 B2) and Scherer et al. (U.S. Pat. No. 6,461,528 B1). Rejections based on the newly cited reference(s) follow.

### ***Claim Rejections - 35 USC § 102***

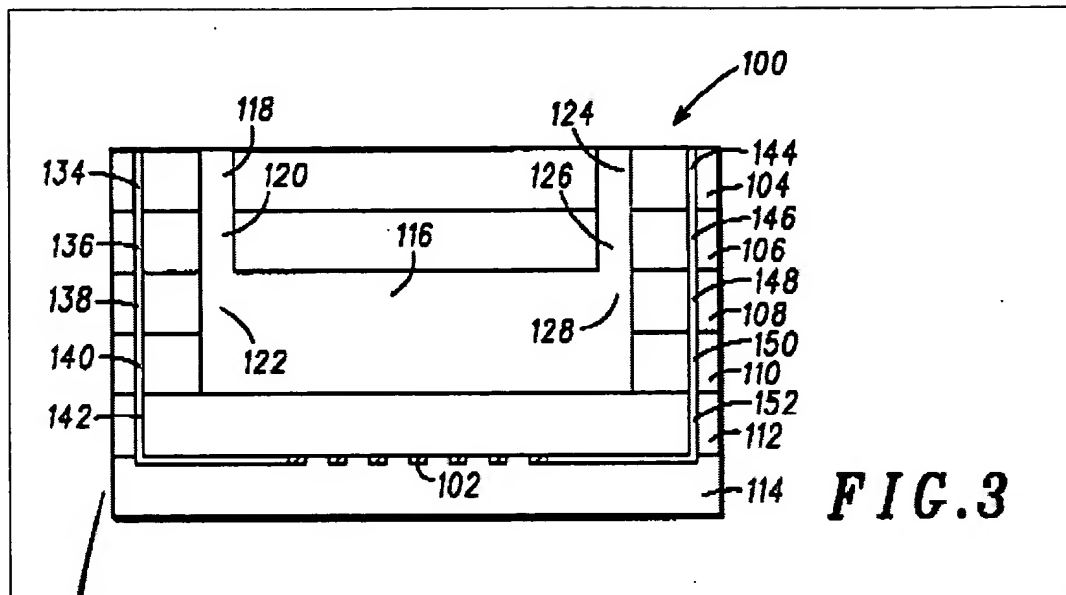
The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

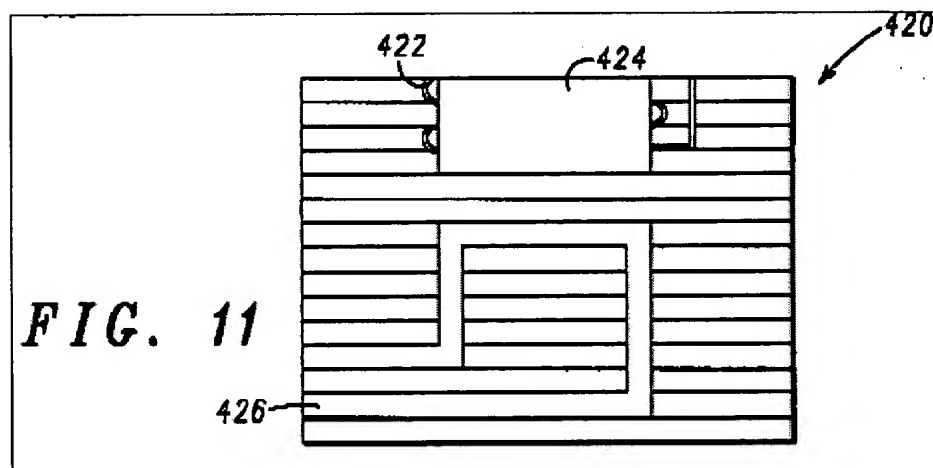
(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

Claims 1, 2, 4, 6, 7, 9, 11 – 13, 15, 16 & 26 – 31 are rejected under 35 U.S.C. 102(e) as being anticipated by Burdon et al. (U.S. Pat. No. 6,572,830 B1) (hereinafter referred to as “Burdon”).

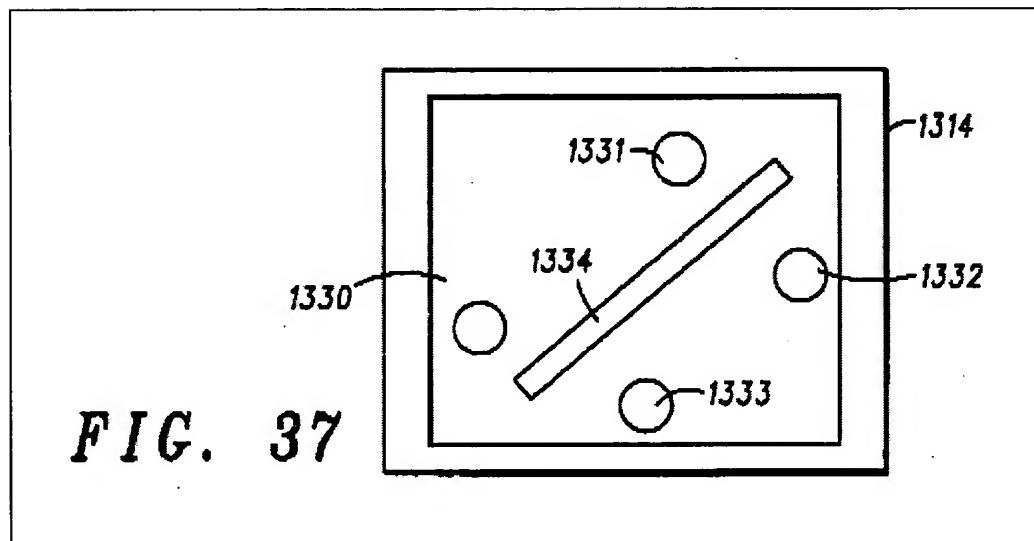
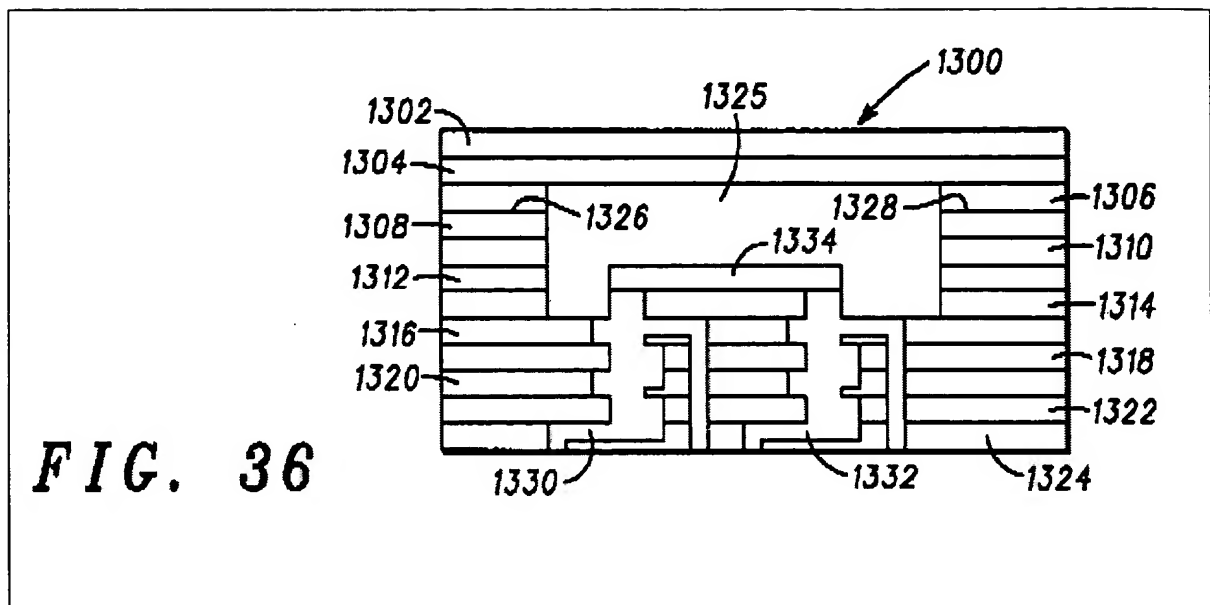
Regarding claims 1, 26, 28 & 31, Burdon teaches an integrated multilayered microfluidic apparatus (100) comprising: substrate layers 104 – 114; a flow path comprising a channel (e.g., cavity 116) comprising an inlet (via 118) and an outlet (via 124); and heaters (102) (see figure 3; col. 13, lines 12 – 38).



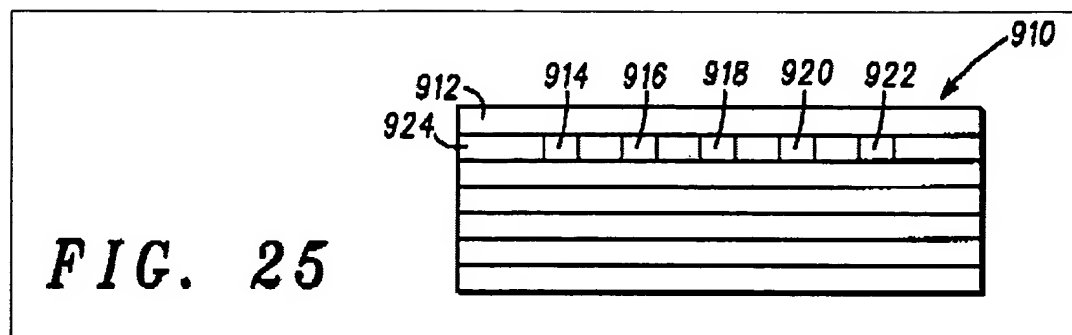
Burdon teaches the incorporation of a heating element comprising a heat exchanger (426) (see figure 11; col. 15, lines 41 – 53).



Burdon further teaches the incorporation of mixing structures (e.g., magnetic stirring bar 1334) within the cavity (1325) (see col. 28, lines 14 – 49; figures 36 & 37).



Regarding claims 2 & 27, Burdon teaches the incorporation of a plurality of flow paths (cavities 914 – 922) (see figure 25; col. 22, line 66 – col. 23, line 8).



Regarding claim 4, Burdon teaches the incorporation of optical fluid sensors for monitoring chemical composition (see col. 17, lines 43 – 47; col. 22, lines 13 – 25).

Claims 6 & 9 are considered process or intended use limitations.

Regarding claim 7, Burdon teaches the incorporation of thermal isolation structures (e.g., cavity 406) (see col. 15, lines 6 – 22; figure 9).

Regarding claims 11 – 13, 15, 16 & 30, although the instant claims recite a specific functional capability, i.e., sections for either nanocrystal nucleation, growth, termination or coating, for the apparatus, as discussed above, Burdon teaches all of the positively recited structure of the claimed apparatus. The Courts have held that apparatus claims must be structurally distinguishable from the prior art in terms of structure, not function. See *In re Danley*, 120 USPQ 528, 531 (CCPA 1959); and *Hewlett-Packard Co. V. Bausch and Lomb, Inc.*, 15 USPQ2d 1525, 1528 (Fed. Cir. 1990). The Courts have held that the manner of operating an apparatus does not differentiate an apparatus claim from the prior art, if the prior art apparatus teaches all of the structural limitations of the claim. See *Ex Parte Masham*, 2 USPQ2d 1647 (BPAI 1987) (see MPEP § 2114).

Regarding claim 29, Burdon teaches the incorporation of a plurality of microfluidic flowpaths (cavities 914 – 922) (see figure 25; col. 22, line 66 – col. 23, line 8).

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

1. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Burdon in view of Faris et al. (U.S. Pat. No. 6,734,436 B2) (hereinafter "Faris").

Regarding claim 3, Burdon does not specifically teach the incorporation of an optical source for heating. However, as evidenced by Faris, the incorporation of an optical heating means with microfluidic devices is well known in the art (see col. 17, lines 40 – 50) (see MPEP 2144.03). Therefore, it would have been obvious to a person of ordinary skill in the art to incorporate an optical source of energy for heating purposes.

2. Claims 5 & 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Burdon.

Regarding claim 5, Burdon teaches the incorporation of a temperature sensor (724) and a heat exchanger (426) (see col. 20, lines 31 – 65; col. 15, lines 41 – 53). Burdon does not specifically teach the incorporation of a controller means, such as a computer. However, the

Art Unit: 1743

incorporation of a computer control means within analytical microfluidic devices is well known in the art (see MPEP 2144.03). Thus, it would have been obvious to a person of ordinary skill in the art to incorporate a controller means as claimed with the disclosed microfluidic apparatus.

Regarding claim 8, it would have been obvious to a person of ordinary skill in the art to incorporate one or more additional ports or vias with the disclosed apparatus. The Courts have held that the mere duplication of parts, without any new or unexpected results, is within the ambit of one of ordinary skill in the art. See *In re Harza*, 124 USPQ 378 (CCPA 1960) (see MPEP § 2144.04).

3. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Burdon in view of Gascoyne et al. (U.S. Pat. No. 6,703,819 B2) (hereinafter "Gascoyne").

Regarding claim 10, Burdon does not specifically teach the incorporation of a particle size sensor. Burdon does teach the incorporation of fluid sensors with the disclosed apparatus (see col. 17, lines 43 – 47). Gascoyne does teach the incorporation of a particle size sensor with an analytical microfluidic apparatus (see Abstract). Hence, a person of ordinary skill in the art would have recognized the suitability of incorporating a particle size sensor with a microfluidic apparatus. Furthermore, as evidenced by Gascoyne, a person of ordinary skill in the art would accordingly have had a reasonable expectation for success in incorporating a particle size sensor with a microfluidic apparatus (see MPEP § 2143.02). Therefore, it would have been obvious to a person of ordinary skill in the art to incorporate a particle size sensor with a microfluidic apparatus.



Art Unit: 1743

4. Claims 14, 17 – 19, 21 & 22 – 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Burdon in view of Pourahmadi et al. (U.S. Pat. No. 6,664,104 B2) (hereinafter “Pourahmadi”).

Regarding claim 14, Burdon does not specifically teach the incorporation of a separation device within the disclosed apparatus. Pourahmadi does teach the incorporation of a separation device (e.g., flow-through component 122) with an analytical microfluidic apparatus (see col. 5, lines 58 – 67). Thus, as indicated by Pourahmadi, a person of ordinary skill in the art would have had a reasonable expectation for success in incorporating a separation device with a microfluidic apparatus. Therefore, it would have been obvious to a person of ordinary skill in the art to incorporate a separation device with an analytical microfluidic apparatus.

Regarding claim 17, Burdon teaches an integrated multilayered microfluidic apparatus (100) comprising: substrate layers 104 – 114; a flow path comprising a channel (e.g., cavity 116) comprising an inlet or port (via 118) and an outlet (via 124); and heaters (102) (see figure 3; col. 13, lines 12 – 38). Burdon teaches the incorporation of various fluid sensors within the disclosed apparatus (see col. 17, lines 43 – 47). Burdon does not specifically teach the incorporation of a separation device within the disclosed apparatus. Pourahmadi does teach the incorporation of a separation device (e.g., flow-through component 122) with an analytical microfluidic apparatus (see col. 5, lines 58 – 67). Thus, as indicated by Pourahmadi, a person of ordinary skill in the art would have had a reasonable expectation for success in incorporating a separation device with a microfluidic apparatus. Therefore, it would have been obvious to a

Art Unit: 1743

person of ordinary skill in the art to incorporate a separation device with the disclosed analytical microfluidic apparatus.

Regarding claims 18, 19, 21 & 22, Pourahmadi teaches that the flow-through component (122) comprises a membrane (see col. 6, lines 1 – 7).

Regarding claims 23 & 24, Burdon teaches the incorporation of a piezoelectric pumping means with the disclosed microfluidic apparatus for providing fluid flow control (see col. 24, line 10 – col. 25, line 37).

Regarding claim 25, Burdon teaches the incorporation of a plurality of flow paths (cavities 914 – 922) (see figure 25; col. 22, line 66 – col. 23, line 8).

5. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Burdon in view of Scherer et al. (U.S. Pat. No. 6,461,528 B1) (hereinafter “Scherer”).

Regarding claim 20, Burdon does not specifically teach the incorporation of a semiconductor membrane. Scherer does teach the incorporation of a semiconductor membrane with a microfluidic device (see figure 1). The Courts have held that the selection of a known material, which is based upon its suitability for the intended use, is within the ambit of one of ordinary skill in the art. See *In re Leshin*, 125 USPQ 416 (CCPA 1960) (see MPEP § 2144.07). Therefore, it would have been obvious to a person of ordinary skill in the art to incorporate a semiconductor membrane with the disclosed microfluidic apparatus.

### ***Response to Arguments***

Applicant's arguments with respect to the pending claims have been considered, but are moot in view of the new ground(s) of rejection.

***Allowable Subject Matter***

Claims 32 – 40 are allowed.

The following is an examiner's statement of reasons for allowance:

Regarding claim 32, the cited prior art neither teach nor fairly suggest the methodology for manufacturing nanocrystals comprising the recited steps of: conditioning nanocrystal forming reagents in a flow path; and monitoring a detectable property of the nanocrystal product and including adjusting the operation the disclosed apparatus to maintain the detectable property of the nanocrystal product in a predetermined range.

Regarding claim 37, the cited prior art neither teach nor fairly suggest the recited methodology of purifying nanocrystals utilizing a microfluidic apparatus.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian J. Sines whose telephone number is (571) 272-1263. The examiner can normally be reached on Monday - Friday (11 AM - 8 PM EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jill A. Warden can be reached on (571) 272-1267. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 1743

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature or set of initials, possibly reading 'J. D.', written in black ink. The signature is stylized with a large loop at the top and a vertical stroke extending downwards.